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ANSWERS TO PROF. JOHNSON'S QUERY IN NO. 3.—"QUERY. Let $u = \frac{\sin ax}{a}$. Now if $a = \infty$, $u = 0$ independently of the value of x, therefore we should have $\frac{du}{dx} = 0$ when $a = \infty$. But we find $\frac{du}{dx} =$ cosine ax which is essentially indeterminate when $a = \infty$. What is the explanation of this paradox?"

BY R. J. ADCOCK.—When $u = 0$ independently of x it is not a function of x, and therefore cannot be differentiated with respect to x. Therefore the value of $du \div dx$ is $\cos ax$ independently of the value of a.

BY PROF. JUDSON.—If $u = 0$, independently of x, then u is not a function of x, and $du \div dx$ is without meaning.

If a is a constant, then a cannot $= \infty$. If a is a variable, independent of x, and $a = \infty$, i. e. a increases without limit, then $\frac{\sin ax}{a} =$ an infinitesimal (not $= 0$), and u is therefore indeterminate; $du \div dx = \cos ax$ is also indeterminate, and there is no paradox.

BY PROF. BARBOUR. Let $u = \frac{\sin 360x}{360}$; $\frac{du}{dx} = \cos 360x$. Now for $x = 1°$, or $2°$ or any other integral number of degrees, $u = 0$; $\frac{du}{dx} = \cos 0° = 1$. Hence it is clear that u may be equal to 0, and yet $du \div dx = 1$.

SOLUTIONS OF PROBLEMS.

342. *By Prof. Kershner.*—"Prove Schlömilch's Theorem: If D_a, D_b, .. D_n are divisors of 10^k+1, so that $N_a = \frac{10^k+1}{D_a}$, $N_b = \frac{10^k+1}{D_b}$, $N_n = \frac{10^k+1}{D_k}$ the k digits or figures of the whole numbers D_a-1, D_b-1, D_n-1 are the k first figures of the circulator or period of $\frac{1}{N_a}$, $\frac{1}{N_b}$, $\frac{1}{N_n}$, respectively.

SOLUTION BY PROF. J. SCHEFFER, HARRISBURGH, PA.

A well known principle relating to circulating decimals is as follows:

If $1 \div M$ *produces a period of* 2k *dicimals, the remainder after the* kth *digit is* $(M - 1)$, *and the following decimals can be obtained by subtracting each digit from* 9.

Now let $10^k + 1 = MN$, where M and N may be prime factors or the product of such; and denote by x the number which represents the first k